



Stieber Clutch helps  
All Terrain wheelchair  
manufacturer along  
the road to success...

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While standard wheelchairs are an essential tool for many people with disabilities, they are still extremely limited in terms of the terrain that they can handle. This is why Tim Morgan has invented the Mountain Trike, a wheelchair designed specifically for use off-road and in difficult conditions. Operating in such harsh conditions can put a strain on the components and at times sourcing parts that could withstand this tough environment proved a challenge. Fortunately Stieber Clutch was able to offer a solution which has so far proven to be 100% reliable.

There is great desire amongst many wheelchair users to go out and enjoy the countryside. However, activities as simple as family trips in the park or ambling along country paths can be difficult or even impossible in a regular wheelchair due to the uneven ground, steep terrain and mud. While some traditional wheelchair designs are available with chunky, 'off-road' tyres, they still require the user to push the wheels to move the chair forward, which results in muddy slippery hands and poor transmission of drive.

The Mountain Trike is the only manual wheelchair on the market that has been designed specifically for all terrain use, combined with everyday practicality. It uses a unique lever drive system that allows the user to power, steer and brake the Trike using two levers which are positioned in front of them. The levers are connected to the wheels using similar technology to that found on a mountain bike and power each wheel independently. A third wheel at the back stabilises the chair and can be steered using a joystick mechanism attached to one of the levers.

Rather than a standard bike freewheel, the Mountain Trike's designer, Tim Morgan, chose to specify an overrunning clutch to transmit the kinetic energy from the levers to the wheels.

Tim explains his reasoning behind the specification: "When the wheels are spinning freely on a mountain bike, without drive from the pedals, the freewheel clicks during the rotation. The Mountain Trike is intended for use during family walks and other lifestyle activities so I wanted to make sure it would run silently. I also found that bike freewheels have a small amount of free travel before it engages. Because the levers are quite long, this translated to several inches of free travel with each push, which was quite jarring for the user and resulted in less efficiency overall. Using an overrunning clutch eliminates both of these issues."



Stieber Clutch helps Mountain Trike, an off-road wheelchair manufacturer, improve reliability.

The Stieber overrunning clutch offers far more in terms of reliable performance and is now specified as standard on all Mountain Trikes.



"During the testing process it was clear that the Stieber clutch offered far more in terms of reliable performance and they are now specified as standard on all Mountain Trikes. Since they have been installed we have had no reported failures, even from some of our more adventurous customers."

Stieber Formsprag overrunning clutches offer a number of unique design features which ensure that they are longer lasting and more reliable than other components on the market.



Mountain Trike's designer, Tim Morgan, chose to specify an overrunning clutch to transmit the kinetic energy from the levers to the wheels.

"I was supplied with the CSK PP overrunning clutch for testing and the superiority of the component was immediately apparent. The seals were clearly far better protected and the movement was much smoother."



While the initial overrunning clutches, specified on early test models, performed as desired short term, it became apparent that over long term use their durability was not up to the standard required for the Trike. Poor seals meant that mud and contaminants could creep inside, which caused seizing, while the poorly machined internal components led to slipping and, eventually, total failure due to the regular shock loading caused by disengaging and engaging the drive train with every push.

Aware that he needed to source an alternative component that could survive in the most extreme terrain, Tim approached Stieber Clutch:

"I was already aware that Stieber Clutch is well known for its quality and reliability in tough industrial applications, so when we began to have problems with the original bought in components I approached the company to see if Stieber was able to offer a solution. I was supplied with the CSK PP overrunning clutch for testing and the superiority of the component was immediately apparent. The seals were clearly far better protected and the movement was much smoother."

Stieber Formsprag overrunning clutches offer a number of unique design features which ensure that they are longer lasting and more reliable than other components on the market. The sprags are manufactured using the company's patented 'Formchrome' process which diffuses chromium carbide into the working surface of the sprag, increasing its surface hardness substantially to deliver excellent wear protection. They are also precision machined to ensure that each sprag is almost identical to the next to prevent uneven rolling movement.

The sprag retainer assembly also features a free action design that permits each sprag to have free and independent action. This independence allows each sprag to adapt to variations in annular space (eccentricities) so that when the clutch is engaged, the load is proportionally shared among all sprags, eliminating the possibility of clutch damage resulting from the entire load being absorbed by just a few sprags. In operation, springs energise the sprags into position for instantaneous engagement with no backlash.

Tim continues: "During the testing process it was clear that the Stieber clutch offered far more in terms of reliable performance and they are now specified as standard on all Mountain Trikes. Since they have been installed we have had no reported failures, even from some of our more adventurous customers."



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Stieber was founded in Munich in 1937 and is now a medium-sized company employing 140 people at its locations in Heidelberg and Garching near Munich.

Stieber can reflect on numerous innovative developments during the course of the company's history; innovations that have made it the European market leader. This ability has been proved for example during the development and design of the largest backstop in the world.

Stieber, part of Altra Industrial Motion Corp., is – together with its sister companies Formsprag and Marland in the USA – the world's market leader for overrunning clutches and backstops.

According to the customer's wishes, or the application requirements, Stieber can design and manufacture special products in addition to the standard programme. It can, and has, supplied units with a torque capacity from less than 1 Nm all the way to 1,700,000 Nm. The latter represents the largest units ever produced, anywhere.

## **DMA Europa Group Ltd**

Europa House | Arthur Drive | Hoo Farm Industrial Estate | Kidderminster | Worcestershire | DY11 7RA

T: +44 (0) 1562 751436 | E: [info@dmaeuropagroup.com](mailto:info@dmaeuropagroup.com) | [www.dmaeuropagroup.com](http://www.dmaeuropagroup.com)